

REMARKS

Claims 1-3 and 5-12 are pending in this application. Claim 1 is independent.

Allowable Subject Matter

Applicants wish to thank the Examiner for indicating that the subject matter of claim 8 is allowable.

Drawing Objection

The drawings have been objected to for not showing a reference number for item 43 described in the specification, on page 6. Accordingly, Applicants provide herewith a corrected drawing for Figure 13 showing a reference number 43. Applicants respectfully request that the drawing be approved and the objection to the drawings be withdrawn.

Objection to the Specification

The specification has been objected to for minor informalities and because the title is not descriptive. Accordingly, an amendment has been made to page 6, line 29 of the specification, and the title has been replaced with a new title "OPTICAL PICKUP DEVICE FOR MAGNETO-OPTICAL DISK". Applicants respectfully request that the objection to the specification be withdrawn.

Claim Objection

Claim 1 has been objected to. Accordingly, claim 1 has been amended as requested, to change "plane" to "planes" and to correct antecedent basis for "other first parallel plane". Applicants respectfully request that the objection be withdrawn.

Claim Rejection; Kobayashi, Yoshida, Ando

Claims 1, 5, 6, and 12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (U.S. Patent 5,621,714 "Kobayashi") in view of Yoshida et al. (U.S. Patent 5,428,595 "Yoshida") and Ando (U.S. Patent 5,272,685). Applicants respectfully traverse this rejection.

Claim 1 is directed to an optical pickup device (e.g., see Fig. 1) comprising as basic elements a source of light (e.g., semiconductor laser 1), a lens (e.g., collimator lens 10), a beam splitter (e.g., beam splitter 2), a photodetector (e.g., photodetector 7), a first diffraction element for servo signal generation (e.g., diffraction element 6) arranged on an optical path extending from the beam splitter (2) to the photodetector (7).

The present claimed invention is an improvement over an optical pickup device (e.g., see Figure 11) having a hologram diffracting element (42) for focus error signal detection arranged in a path between a laser diode and magneto-optical recording medium. Applicants have determined that such an arrangement results in reduction in light, requiring an increase in the power of the light source (present specification at page 5, lines 13-17). Also, the

hologram diffraction element causes some stray light to become incident on the objective lens, be reflected by the magneto-optical recording medium and projected on photodiodes as a false signal (present specification at page 5, lines 18-22).

Kobayashi discloses an optical pick-up apparatus comparable to the prior art device shown in Fig. 11 of the present application. In particular, like the prior art device shown in Fig. 11, Kobayashi discloses an apparatus having holograms 112c and 112d (e.g., as shown in Fig. 24 of Kobayashi) for focus error detection located on the optical path between the light source 111 and the prism 112. The holograms 112c and 112d are arranged for diffracting return beams reflected in the parallel prism by surface 112a for focus error signal detection by light receiving regions 121 and 120, respectively (see column 20, lines 49-55). The holograms 112c and 112d are formed in a surface 112b of a parallel prism 112. In addition, Kobayashi discloses an optical pick-up apparatus having a polarizing film 116 applied on one end of opposing surfaces of the parallel prism 112, and having a uniaxial birefringent crystal in the form of a parallel plate 113 applied to the polarizing film 116.

Thus, like the arrangement in present Figure 11, both Kobayashi and present Figure 11 show a hologram diffraction element for focus error detection located in the path of the light source and the parallel prism. This arrangement in Kobayashi will also suffer from optical loss introduced at the hologram diffraction elements 112c and 112d, and false focusing and tracking error signals due to stray light reflected at the magneto-optical recording medium

117. In particular, like the arrangement in present Figure 11, the hologram diffraction elements 112c and 112d diffract emitted light only passes a 0th order diffracted beam and causes some stray light to become incident on the objective lens, be reflected by the magneto-optical recording medium and projected on photodiodes as a false signal. Furthermore, because of the arrangement of photodetectors 118, 119, 120, and 121 with respect to divergent beam paths for focus error signal component and magneto-optical signal component, the photodiode substrate in Kobayashi would be required to be a multiple of the length of typical photodiode substrates. (present specification at page 5, line 13, to page 6, line 7).

Thus, unlike Kobayashi, the present claimed invention comprises a first diffraction element which receives light reflected from the magneto-optical recording element past the first and second members of the beam splitter. For example, the return signals for the magneto-optical recording medium component of the present invention are transmitted along an optical path extending from the beam splitter (2) through the first diffraction element (6) to the photodetector (7). In contrast to the prior art, the first diffraction element transmits a focus error signal but is not located along an optical path extending from the laser light source to the magneto-optical recording medium. Thus, the present invention prevents false focusing and tracking error signals introduced at a hologram diffraction element and enables use of a much smaller photodiode substrate. (see present specification at page 17, second full paragraph).

For further background on the problems of using holograms in the path between the light source and the magneto-optical recording medium, the Examiner is directed to Nagahama et al. (U.S. Patent 5,049,732; related to previously submitted JP 7-3703), provided as an attachment herewith. Nagahama at a section in column 3, line 60, to column 4, line 31, describes the formation of phantom lines A at the hologram diffraction element 43 (shown in Nagahama, Figure 15). Due to the phantom lines A, spurious signals are generated as focus error signals, causing incorrect focus control. The present invention is a solution to that problem.

Applicants submit that Kobayashi fails to teach or suggest at least the claimed first diffraction element arranged on an optical path extending from the beam splitter to the photodetector.

Furthermore, the present invention improves over the known prior art device having the hologram diffraction element, by a specific arrangement of a prism in the beam splitter. In particular, the beam splitter in a preferred embodiment includes a first member, as a prism, and a second member adjacent to the first member. The first member has a parallelogramic cross section having first parallel planes and second parallel planes, the second parallel planes traversing the first parallel planes at a predetermined angle, one of the first parallel planes being arranged in contact with the second member.

The predetermined angle is such that light output from the source of light and incident on the one second parallel plane at a predetermined angle of

incidence, is reflected initially by an other first parallel plane and then by the one first parallel plane and emerges from the other second parallel plane.

Thus, it can be seen that unlike the present invention, the apparatus in Kobayashi includes holograms 112c and 112d formed in a surface 112b of the prism (see Fig. 25), and a polarizing film 116 and birefringent crystal applied to another surface of the parallel prism. The present invention instead, among other things, includes light from the light source incident on a second parallel plane of the prism at a predetermined angle of incidence, the beam splitter having a second member, and a first diffraction element arranged on an optical path extending from the beam splitter to the photodetector. Thus, unlike Kobayashi, the present claimed invention is arranged such that light from the light source is incident on a plane of the prism at a predetermined angle of incidence. In Kobayashi, light from the light source is incident on the holograms 112c and 112d.

Thus, Applicants submit that Kobayashi fails to teach or suggest at least a light from the light source incident on a second parallel plane of the prism at a predetermined angle of incidence, the beam splitter having a second member, and a first diffraction element arranged on an optical path extending to the photodetector.

Still further, Kobayashi's apparatus includes a polarizing film 116 between a plane 112e of the parallel prism 112 and a parallel plate 113. The light from the laser is reflected and made incident upon the polarizing film 116

as S polarized light. Part of the incident light is reflected by the polarizing film to the magneto-optical record medium. The polarizing film 116 completely transmits the P polarized component of the return beam and reflects the remaining return beam. The plate 113 is of a uniaxial birefringent crystal having a lower refractive index for ordinary light than the refractive index for extraordinary light, thereby dividing the return beam into polarized beams.

In the present invention, on the other hand, the first member of the beam splitter has a different index of refraction than the second member enabling an angle of division of light into polarized beams through the plane at which the first and second members contact each other. Thus, in the present invention, there is no polarizing film and the first member of the beam splitter is adjacent to the second member.

Applicants submit that Kobayashi fails to teach or suggest the claimed second member adjacent to said first member of the beam splitter.

The Office Action relies on Yoshida for teaching a diffraction element divided in two by a line parallel to a plane orthogonal to the first and second parallel planes of the prism. In particular, Yoshida shows a diffraction element 20 in an optical apparatus (Fig. 5). However, Applicants submit that the diffraction element in Yoshida would be considered an alternative to the parallel prism/hologram arrangement in Kobayashi, not an additional component in combination with the parallel prism/hologram. Yoshida does not disclose a parallel prism in conjunction with its diffraction element. Thus,

Yoshida fails to teach or suggest a diffraction element arranged on an optical path extending between a beam splitter and the photodetector. Still further, because Yoshida does not disclose a beam splitter, it fails to disclose the diffraction element divided in two by a line parallel to a plane orthogonal to the first and second parallel planes of the beam splitter.

Ando is relied on for teaching members of the beam splitter made of anisotropic optical material. However, Ando also fails to disclose first and second members having parallelogramic cross sections, and other aspects of the claimed arrangement. Thus, Ando fails to make up for the deficiencies of Kobayashi and Yoshida.

Accordingly, Kobayashi, Yoshida and Ando, either alone or in combination, fail to teach each and every claimed element. Applicants submit that the rejection thereby fails to establish *prima facie* obviousness and respectfully request that the rejection be withdrawn.

Claim Rejections

Claims 2, 3 and 10 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kobayashi, Yoshida, and Ando and further in view of another embodiment of Kobayashi. Claim 7 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Kobayashi, Yoshida, and Ando and further in view U.S. Patent No. 5,790,504 to Hayashi et al. Claim 9 has been rejected

under 35 U.S.C. §103(a) as being unpatentable over Kobayashi, Yoshida, and Ando and further in view U.S. Patent No. 6,266,313 to Yanagawa et al. and Claim 11 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Kobayashi, Yoshida, and Ando and further in view Japanese Patent No. JP 10101486 to Komatsu et al.

At least for the reasons above for claim 1, Applicants submit that Kobayashi, Yoshida and Ando, either alone or in combination, fail to teach each and every claimed element of the dependent claims, as well. Thus, Applicants submit that *prima facie* obviousness has not been established for claims 2, 3, 5-7, and 9-12, and respectfully request that the rejection of those claims be withdrawn.

Further with respect to claim 7, the claimed second diffraction element divides the received light from the source of light into at least three beams of light, e.g., two tracking beams and one information reproducing beam. As is admitted in the Office Action, Kobayashi fails to disclose a diffraction element that divides light received from the source of light. Rather, holograms 112c and 112d diffract light of a return beam (see column 20, lines 49-55).

The Office Action relies on Hayashi to teach the deficiency of Kobayashi of failing to teach a second diffraction element that divides light received from the light source. In particular, the Office Action directs Applicants' attention to Figure 1 and an associated description on column 6 of Hayashi. In column 6, Hayashi states that, "light passing the polarized light separation plane 23a of the polarizing prism 23 is incident on the holographic diffraction grating 22..."

It goes on to state that, "This incident light is diffracted with a diffraction angle of approximately 5-25 degrees such that ... the diffracted light is incident on the one photodiode 18...". In other words, the description on column 6 concerns light from the return path to the photodiode 18, as well as photodiode 19 (see column 6, lines 12-19). On column 5, lines 35-38, Hayashi discloses that light emitted from the laser diode 17 passes the holographic diffraction grating 22 and is incident on the polarized light separation plane 23a of the polarizing prism. Thus, it can be seen that Hayashi teaches the same use of a hologram as Kobayashi, and thus fails to make up for the deficiency. Therefore, at least for these additional reasons, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 7.

CONCLUSION

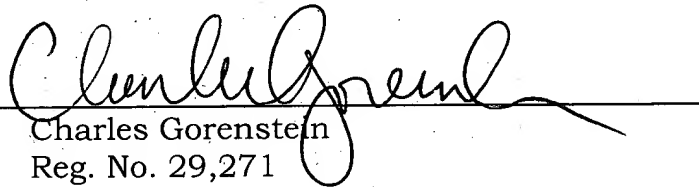
All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and such allowance is respectfully solicited. Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222), to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a two (2) month extension of time for filing a reply in connection with the present application, and the required fee of \$420.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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